

THAT WHICH IS CLAIMED:

1. A method for the targeted application of at least one reagent onto immobilized biological material comprising the steps of
  - (a) localizing immobilized biological material selected from the group consisting of cells, cell parts, and chromosomes onto a support slide;
  - (b) placing the support slide having the immobilized biological material onto an optical scanning device;
  - (c) recording the position of an object of interest of the immobilized biological material with respect to the optical scanning device;
  - (d) positioning a micropipette over the position of the object of interest recorded in step (c) and
  - (e) Applying the reagent onto the object of interest.
2. The method according to claim 1 wherein the optical scanning device is a microscope.
3. The method according to claim 2 wherein a lens of the microscope is replaced with the micropipette.
4. The method according to claim 1 wherein the applying step further comprises applying the reagent in a localized area substantially limited to the position of the immobilized biological material.
5. The method according to claim 1 wherein the step of applying the reagent further includes the use of an automated pipette for dispensing a pre-selected volume of the reagent.
6. The method according to claim 4 wherein the step of applying the reagent onto a localized area further includes placing a cover slip over the immobilized biological material following the step of applying a reagent.
7. The method according to claim 1 further comprising the additional step of photographing the immobilized biological material.

8. The method according to claim 7 wherein the photographs are displayed, thereby providing an additional selection step for selecting a position for the applying step.
9. The method according to claim 1 comprising the additional step of washing the immobilized biological material following an incubation interval.
10. The method according to claim 1 comprising the additional step of washing the reagent applied from the immobilized biological material following application of the reagent.
11. The method according to claim 10 comprising the additional step of positioning an analyzing device over the recorded position of the immobilized biological material.
12. The method according to claim 1 wherein the immobilizing biological material is labeled with a specific marker.
13. The method according to claim 1 wherein the immobilized biological material further comprises metaphase chromosomes.
14. The method according to claim 11 wherein the reagent is selected from a group consisting of a DNA, an RNA, and a polypeptide.
15. The method according to claim 1 wherein the reagent further comprises a plurality of different labelings.
16. The method according to claim 15 wherein one of said plurality of reagents further comprises a fluorescent dye.
17. The method according to claim 14 wherein the reagent specifically binds to the immobilized biological material.
18. The method according to claim 17 wherein the specific binding of the reagent to the biological material comprises an antigen/antibody reaction.
19. The method according to claim 17 wherein the specific binding of the reagent to the biological material is a hybridization reaction.

20. The method according to claim 17 wherein the binding of the reagent to the immobilized biological material further comprises a ligand/protein reaction.
21. A method for the targeted application of at least one reagent onto one or several small regions of interest containing rare biological objects of interest within a large amount of immobilized biological material comprising the steps of:
- (a) depositing immobilized biological material selected from the group consisting of tissue, cells, cell parts, and chromosomes onto a support slide;
  - (b) placing the support slide having the immobilized biological material onto an automated optical scanning device;
  - (c) automatically detecting the biological objects of interest and recording their positions with respect to the slide;
  - (d) automatically positioning a micropipette over the regions of interest defined by the positions of the biological objects of interest recorded during step (c); and
  - (e) applying the reagent onto the regions of interest.
22. The method according to claim 21 wherein the optical scanning device is a microscope comprising a motorized x-y stage and motorized focus control which is connected to a digital image analysis system.
23. The method according to claim 22 wherein a micropipette device is attached to an empty objective position of the objective turret of the microscope and wherein the micropipette is brought into the optical axis of the microscope by switching the objective turret between the observation position and the pipette position.
24. The method according to claim 23 wherein the step of applying the reagent further includes the use of an automated pipette for dispensing a pre-selected volume of the reagent.

25. The method according to claim 21 wherein the step of applying the reagent onto a region of interest further includes placing a cover slip over the region of interest following the step of applying the reagent.
26. The method according to claim 21 further comprising the additional step of automatically relocating the detected objects of interest for selecting the objects suited for applying the reagent.
27. The method according to claim 21 further comprising the additional step of automatically recording images of the biological objects of interest.
28. The method according to claim 27 further comprising the additional step of reviewing a gallery of recorded images on a display device for selecting the objects suited for applying the reagent.
29. The method according to claim 21 wherein the objects of interest are labeled with a specific marker.
30. The claim according to claim 29 wherein the specific marker is detected by means of a chromogenic or fluorescent dye.
31. A method for the targeted application of at least one reagent onto one or several small regions of interest containing biological objects of interest within a large amount of immobilized biological material comprising the steps of:
  - (a) depositing immobilized biological material selected from the group consisting of tissue, cells, cell parts, and chromosomes onto a support slide;
  - (b) placing the support slide having the immobilized biological material onto an automated optical scanning device;
  - (c) automatically detecting the biological objects of interest and recording their positions on the slide;
  - (d) automatically marking the positions recorded during step (c) by contacting the slide with a marking device; and,
  - (e) manually applying the reagent onto the regions of interest centered around the positions that have been marked during step (d).

32. The method according to claim 31 wherein the optical scanning device is a motorized microscope comprising a motorized x-y stage and motorized focus control which is connected to a digital image analysis system.
33. The method according to claim 32 wherein the immobilized biological material is observed under epi-illumination and the marking device is attached to the condenser holder of the microscope and the slide is lowered to bring the marking device into contact with the back surface of the slide.
34. The method according to claim 31 wherein the marking device is a pen.
35. The method according to claim 31 wherein the marking device is a diamond tip.
36. A dispensing apparatus for the application of reagents in conjunction with an optical microscope comprising:
  - the housing defining a top, a bottom, and at least one sidewall, said top defining a threaded surface, said threaded surface adapted for securement to a turret of an optical microscope;
  - a first opening defined along the bottom of the housing, said opening in axial alignment with a central axis defined along a length of the housing;
  - a conduit, defined within an interior of the housing, said conduit in communication with said first opening and in further communication with a second opening defined along a sidewall of the housing;
  - wherein, when said first opening, said conduit, and said second opening are in communication with a micropipette dispenser, a controlled volume of a reagent may be delivered from the micropipette dispense to a substrate opposite the first opening.
37. The dispensing apparatus according to claim 36 wherein said conduit is adapted for receiving a length of microtubing.

38. A diagnostic kit for the analysis of an immobilized biological material comprising an optically clear cover slip having at least one reagent for contact hybridization affixed thereto.

0989304-070904  
T05020-40E6660